FORM 2

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THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

[See section 10, Rule 13]

A SATELLITE DISPENSING SYSTEM FOR CUBESAT;

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THE FOLLOWING SPECIFICATION PARTICULARLY DESCRIBES THE INVENTION AND THE MANNER IN WHICH IT IS TO BE PERFORMED.

FIELD OF THE INVENTION

[0001]The present invention relates to satellites and more particularly to a satellite dispensing system for cubesat.

BACKGROUND OF THE INVENTION

[0002] In the field of space exploration, nano satellites were developed to be launched into space by launch vehicles whereas each satellite is contained/ stored in a “dispenser” device sometimes referred to as small scale satellite “deployer”, configured to deploy the small satellite in a controlled manner to achieve desired orbit.

[0003]It has been observed that the CubeSats have been extremely successful in easing access to space whereas the small size and encapsulation maximize launch opportunities and allow the manufacturer to design the payload with different materials and varying manufacturing techniques. It also enables the launch vehicle (LV) to utilize existing capability with minimal risk to the primary payload.

[0004]Satellites complying with CubeSat design specification may have a size and form factor of a corresponding type or class of CubeSat as defined by the standard. For example, CubeSat comprises of classes designated as 1U, 2U, 3U, 6U and 12U.

[0005] It has been observed that generally the CubeSat deployers have a shape, size and a form factor to accommodate a corresponding CubeSat

satellite, and commonly have a door to access the payload area of the deployer. The CubeSat (Payload) is loaded into the dispenser through the opening associated with the door whereas the door is kept in open condition. The door is closed and secured in the closed position. The dispenser may be arranged with other dispensers in a deck configured to accommodate multiple dispensers and launched into space. Typically, a satellite is deployed by causing the dispenser door to open at a precise time, resulting in the ejection of Cubesat into the desired orbit. For the above requirement, a nano-satellite deployer is required with adaptive door holding and release mechanisms and payload restraint scheme.

[0006] IN288546 discloses a satellite separation system and a method thereof. The dispenser system is able to deploy one satellite whereas the system mass is relatively high per unit of the mass of payload. A scissor clamp mechanism is used for door holding which is released by fusing of Nylon rope. Nylon rope, passing through a heater wire made of metal. Satellite movement is arrested by using preloading studs from front and back side of the satellite. The limitation of the system is that it cannot accommodate the satellites as per Cubesats Design Specification. Additional interfaces are required to be generated on the satellite to render it compatible with the system. System mass is relatively high per unit payload mass. Door release system actuation time after issuance of the command signal is also high. System provides only a single mounting

configuration interfaces provided for integrating the dispenser into the launch vehicle.

[0007] US9415883 B2 discloses a canisterized satellite dispenser. The system is not designed to accommodate nano satellites which made according to Cubesat Design Specification Standardas it is to be altered with a projected flange for getting guided by the dispenser rails. A door opening through motor cam arrangement is provided. Satellite restraining mechanism is an arrangement using flexural elements (i.e.Compliant mechanism). The system uses a motor cam arrangement which is complex in construction.

[0008] WO2019028404A1 discloses a satellite deployer door release mechanism. This application mainly describes door mechanism for the CubeSat deployers. A pyro-technic cutter for the release of the mechanism is used.

[0009] US 9,567,115 B2 discloses a door mechanism for satellite deployer system. This invention explains a door mechanism having a door locking mechanism which comprises a ball lock actuated by a pin puller mechanism using a shape memory alloy with a dent mechanism. The Satellite canister consists of two doors wherein the door halves are clamped through the pin puller. The mechanism elements are housed in the body of the deployer, which increases the envelope of the system.

[0010]WO2019028410A1 discloses a Satellite deployer having an externally adjustable payload restraint. This application describes a deployer and method for cubesat. Satellite rattling in the dispenser is arrested using protruding pins inside the canister. Pyrocutter door release mechanism is employed. The system cannot accommodate plurality of satellites. It doesn't address the problem of shock associated with the mechanism used for the actuation.

[0011] EP2066566B1 discloses a transportation and ejection unit picosatellites. It provides a transport and ejection unit for picosatellites. The release mechanism consists of a magnet holder and is operated electrically. The system cannot accommodate plurality of nanosatellites.

[0012]CN104724303A discloses a Cube satellite orbit deployer. A door opening mechanism is used by the invention which is controlled electromagnetically through the cooperation of the permanent magnet and the direct current electromagnetic coil.

[0013] EP3243758B1 discloses an ejection unit for a satellite. A release mechanism consists of an electromagnetic holder. Four compression and two tension springs are provided for the release mechanism of door. A wedge and roller mechanism is used for avoiding rattling whereas the door release mechanism is actuated by a permanent magnet.

[0014] The publication 'Nichrome Burn wire release mechanism for Cubesats. Proceedings of 41st aerospace mechanisms symposium, JPL,

May 16-18,2012. NASA' discloses a system with a door which is stowed using Vectran rope. The vectranrope is fused using a Nichrome heating wire. Mechanisms mounted on to the body which increases the envelope size.

[0015] The publication discloses 'Rail Picosatellite Orbital Deployer (RailPOD). User Guide for Payloads and Launch Vehicles (TK-RPUG-Rev2). December 2016. Tyvak Nano-satellite systems Inc.'. It employs a door release mechanism using a demagnetizing clamp. Mechanisms mounted on to the body which increases the envelope size. Rattling arresting mechanisms is not provided.

[0016] The publication 'DRAGON-8U Nano-Satellite Orbital Deployer. https://ntrs.nasa.gov/search.jsp?R=20150004082 2020-02-12. Marcin Dobrowolski* Jerzy GrygorczukMartaTokarz* and Maciej Borys*' discloses a unit for one 8U. To hold the door during take-off, HDRM is used, which is released by the Dyneema cord melting system. A Space craft is arrested by using locating pins coming from door side which needs extra provisions in the satellite (other than CDS) and increases the complexities of the system. The system comprises two halves door type configuration.

[0017] The publication 'Development of the Standard CubeSat Deployer and a CubeSat Class PicoSatellite. California Polytechnic State University San Luis Obispo, CA 9340. Authors- Jordi Puig-Suari, Aerospace Engineering Dept. jpuigsua@calpoly.edu (805) 756-6479, Clark Turner,

Computer Science Dept. csturner@calpoly.edu (805) 756-6133. William Ahlgren Electrical Engineering Dept. wahlgren@calpoly.e du (805) 756-2309' discloses a system that can accommodate an international standard 1U, 2U and 3U CubeSat..A box type construction with door for accommodating satellite, and jettisoning spring for the ejection. It does not have a mechanism to avoid rattling of CubeSat inside the box. Deployment is initiated by the release of the P- POD'S spring loaded door using a G & H Technologies cable release actuator.

[0018]It has been observed that some of conventional devices cannot accommodate satellite as per cubesats design specification. Further, it has also been observed that some of, the systems mass is high for unit payload mass. The door release system actuation time after receiving command/ signal is also high or delayed. Whereas some satellite dispensing systems have limitations due to their single mounting configuration. Furthermore, it has also been observed that some of the systems due to their design or configuration limitation cannot accommodate plurality of 3U Cubesats weighing more than 3 kg.

[0019]It has also been observed that the existing satellite dispensing system have relatively complex actuation system for releasing the satellite into the desired orbit which takes more time in actuating and performing the command.

In order to address these limitations, a deployer for clustered nano satellites is required. Therefore the object of the present invention is to solve one or more of the aforesaid issues.

SUMMARY

[0020] In accordance with the present invention, a satellite dispensing system for cubesat deployer is provided. The system comprising: a structure having multiple canisters for storing the satellites; a door assembly removeably adapted at the opening side of the canister; a door lock and release mechanism disposed inside the door assembly to lock and release the door; a wire unit connected with the door lock and release mechanism at one end and to a fuse at another end; and a control unit having an actuator unit connected with the fuse, the control unit is configured to fuse the wire unit to release each satellite from the canister into a predefined orbit upon receiving an actuation command in a predetermined fraction of time.

[0021] In accordance with the present invention, each canister is connected with a pusher plate and a compressed jettisoning spring for ejecting the satellite out of the canister.

[0022] In accordance with an embodiment of the present invention, the pusher plate exerts a force in the event of fusing of the metal wire.

[0023] In accordance with an embodiment of the present invention, the structure comprises a clamping rail mechanism located at the corners of the canisters to support and restrain the lateral movement of the satellite.

[0024] In accordance with the present invention, the predetermined time of ejecting the satellite is 900 ms after receiving the actuation command signal.

[0025] In accordance with an embodiment of the present invention, the door lock and release mechanism is having: a door assembly removeably adapted at the opening side of the canister; a pair of release pin disposed at the side of door assembly, the release pins are attached to preloaded linear springs; a piston middle having a piston connected with the preloaded linear springs, the piston middle is placed at a rocker link and supported by a pair of plunger pins to restrain the movement of release pins (1) in the locked condition; a lever arm connected to the rocker link at one end and to a metal wire at another end, the metal wire is adapted to prevent the rotation of the arms and holding all the links to keep the door locked till the ejection of the satellite; and a door-locking mechanism disposed near the door hinge to lock the door after ejection of the satellite. The door lock and release mechanism comprises a door rail. The piston middle is connected with a piston middle spring.

[0026] In accordance with the present invention, the metal wire unit is connected with a fuse to retract both the release pins (1) from their locked

condition and allows the door to open. The metal wire unit is fused upon receiving an input current allowing the rotation of the lever arms.

[0027] In accordance with an embodiment of the present invention, the preloaded linear springs are disposed in a cavity provided in the structure to lock the door in the closed condition.

[0028] In accordance with an embodiment of the present invention, the system comprises reed switches disposed on the side panel nearer to the door hinge adaptor and magnets disposed at pusher plate assembly.

[0029] In accordance with an embodiment of the present invention, the pusher plate is connected with a stopper bracket to restrain the movement of the pusher plate after ejection of the satellite. The clamping rail mechanism comprises a pre-loading stud (17) attached to the door frame (7) which pushes a rod (18) against a cam (19).

[0030] In accordance with an embodiment of the present invention, the system is having a payload capacity of 24 kg. The system comprises a structure having plurality of canisters whereas each canister (15)store one 3U class satellite (21) having a mass up to 6 kg.

[0031] In accordance with an embodiment of the present invention, the system comprise micro switches (22) adapted for each satellite (21) to impart signal to the control unit for opening the door assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] Reference will be made to embodiments of the invention which may be illustrated in the accompanying figure(s). These figure(s) are intended to be illustrative and not limiting. Although the invention is generally described in the context of these embodiments, it should be understood that it is not intended to limit the scope of the invention to these particular embodiments.

Figure 1 shows the assembled view of the satellite dispensing system in closed actuation in accordance with an embodiment of the present invention;

Figure 2 shows door release mechanism of the satellite dispensing system in closed actuation in accordance with an embodiment of the present invention,

Figure 3shows door release mechanism of the satellite dispensing system in opened actuation by single wire fusing in accordance with an embodiment of the present invention;

Figure 4 shows door release mechanism of the satellite dispensing system in opened actuation by double wire fusing in accordance with an embodiment of the present invention;

Figure 5 shows the Clamping Rail mechanism of the satellite dispensing system in clamped condition in accordance with an embodiment of the present invention;

Figure 6 shows the Clamping Rail Mechanism of the satellite dispensing system in released condition in accordance with an embodiment of the present invention;

Figure 7 shows the micro-switch arrangement and door locking mechanism in closed condition in accordance with an embodiment of the present invention;

Figure 8 shows the micro-switch arrangement and door locking mechanism in opened condition in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The following description with reference to the accompanying drawings is provided to assist in a comprehensive understanding of exemplary embodiments of the invention as defined by the claims and their equivalents. It includes various specific details to assist in that understanding but these are to be regarded as merely exemplary. Accordingly, those of ordinary skill in the art will recognize that various changes and modifications of the embodiments described herein can be made without departing from the scope and spirit of the invention. In

addition, descriptions of well-known functions and constructions are omitted for clarity and conciseness.

The terms and words used in the following description and claims are not limited to the bibliographical meanings, but, are merely used by the inventor to enable a clear and consistent understanding of the invention. Accordingly, it should be apparent to those skilled in the art that the following description of exemplary embodiments of the present invention are provided for illustration purpose only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

It is to be understood that the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a component surface" includes reference to one or more of such surfaces.

[0033] The present invention discloses a satellite dispensing system for cubesat deployer. The system comprising: a structure having multiple canisters for storing the satellites, a door assembly removeably adapted at the opening side of the canister; a door lock and release mechanism disposed inside the door assembly to lock and release the door; a wire unit connected with the door lock and release mechanism at one end and to a fuse at another end; and a control unit having an actuator unit connected with the fuse, the control unit is configured to actuate the actuator to release each satellite from the canister into a predefined orbit

upon receiving an actuation command signal in a predetermined fraction of time.

[0034] Referring to Figure 1, a satellite dispensing system accommodating four nano satellites in accordance with an embodiment of the present invention is shown. The system is having a total payload capacity of 24 kg. The system comprises of a structure having a box-type construction which is further divided into four canisters. In accordance with the present invention, each canister accommodates one 3U class satellite (21) having a mass up to 6 kg. The system comprises a back up plate (13), a clamping rail mechanism (14), four canisters having door assembly units (15) and bulk head with door, electrical connector & and locking mechanism interfaces (16).

[0035] In accordance with an embodiment of the present invention, each canister of the system has four rails located at the corners to support the satellite axially. The rails also act as lateral arrestors until the satellites are fully ejected from the canister into the predefined orbits. Each canister has its own pusher plate to eject the satellite using the energy provided by a jettisoning spring and an independent door housed with a pin locking and release mechanism.

[0036] In accordance with the present invention, the satellites (3U) are inserted into the canisters manually causing the compression of jettisoning springs. The compressed jettisoning springs are enclosed inside their

respective pusher plate assemblies and are adapted to impart sufficient kinetic energy to achieve the required satellite ejection velocity. To prevent the pusher plate and spring from coming out of the canisters as debris, two stoppers are provided to each pusher plate. After completion of the ejection stroke, the pusher plate comes in contact with a stopper bracket and its further movement is restricted.

[0037] Referring to Figure2, a door lock and release mechanism is shown. The door lock and release mechanism is having: a door assembly removeably adapted at the opening side of the canister; a pair of release pin disposed at the side of door assembly, the release pins are attached to preloaded linear springs; a piston middle having a piston connected with the preloaded linear springs, the piston middle is placed at a rocker link and supported by a pair of plunger pins to restrain the movement of release pins (1) in the locked condition; a lever arm connected to the rocker link at one end and to a metal wire at another end, the metal wire is adapted to prevent the rotation of the arms and holding all the links to keep the door locked till the ejection of the satellite; and a door-locking mechanism disposed near the door hinge to lock the door after ejection of the satellite.

[0038] In accordance with an embodiment of the present invention, the door mechanism used by the invention is a Hold Down and Release type Mechanism (HDRM), in which it encloses the satellite in the dispenser during launch and deploys the same when the desired orbit is reached. All

the components of the door lock and release mechanism are housed inside the door assembly and covered with a closure plate. The function of locking and releasing of the door assembly is performed by a wire based fuse. The door assembly is disposed with two preloaded torsion springs which provide the necessary torque as required for opening the door. The major components of the door lock and release mechanism are release pin (1), holder (2), release spring (3), piston middle (4), door rail (5), piston middle spring (6), door frame (7), plunger pin (8), lever arm (9), metal wire (10), piston (11) and rocker link (12).

[0039] In accordance with an embodiment of the present invention, two release pins are located at the side of door assembly, with two preloaded linear springs known as releaser springs (3), are inserted into a cavity provided in the structure which causes the door to lock in the closed condition as shown in section A-A of the figure 1. The reaction force of the release springs (3) is taken by a piston middle (4) which restricts the movement of release pins (1) in the locked condition. The piston middle (4) rests on a rocker link (12) which in turn is supported by two plunger pins (8). The vertical movement of each plunger is further constrained by one end of the respective lever arms (9). The other end of each lever arm (9) is connected to a metal wire (10) which prevents the rotation of the arms and thus holding all the links in place to keep the door locked. This wire fuses upon receiving an input current from the actuator unit allowing the rotation of the lever arms (9).

[0040] In accordance with the present invention, the system is configured to work with fusing of only one wire taking place whereas the fusing of the wire finally retracts both the release pins (1) from their locked condition and allows the door to open.

[0041] In accordance with another embodiment of the present invention, once the door is opened fully, it gets locked by a door-locking mechanism provided near the door hinge.

[0042] Figure 3 shows a configuration of the door lock and release mechanism in accordance with an embodiment of the present invention. As per this embodiment, the system comprises a fails-safe provision in case if single metal wire is fail to fuse, the mechanism will actuate and allows the door to open fully.

[0043] Referring to Figure 4, the door release mechanism of the satellite dispensing system is shown in opened actuation by double wire fusing in accordance with an embodiment of the present invention. The fusing of both the wire i.e. primary wire and redundant fusing wire allows retraction of both the release pins (1) from their locked condition and allowing the door to open.

[0044] Figure 5 shows a clamping rail mechanism of the satellite dispensing system. The clamping rail mechanism functions as to avoid rattling or lateral movement of satellite stored inside the canister in the event of launch and vibration loads. Normally, the rattling is occurred due

to intentional clearances provided between the satellite and rails for ensuring hindrance free ejection. In accordance with the present invention, the clamping mechanism eliminates these clearances while door is in closed condition by laterally preloading the satellite against the rail. A positive clearance is obtained at the time of door opening which allows free movement of satellite.

[0045] In accordance with an embodiment of the present invention, the clamping mechanism consists of a pre-loading stud (17) attached to the door frame (7) which pushes a rod (18) against a cam (19). The cam in turn transfers the load to the movable portion of the rail which is known as CRM latch (20). The CRM latch presses against the satellite (21) resulting in its lateral locking.

[0046] Figure 6 shows clamping rail mechanism in disengaged position from the satellite (21) after the door opening. This allows the satellites (21) to come out of the canister easily with the aid of jettisoning spring.

[0047] Figure 7 shows the configuration of micro switches (22) adapted for each satellite (21), which will provide a confirmation signal of full opening of door assembly. The micro switches are connected with a Control Unit.

[0048] In accordance with another embodiment of the present invention, Figure 7 also shows the door locking mechanism provided to avoid the rebounding of the door after opening. The mechanism involves two spring (24) loaded pins (23) which enter into a groove provided on the door frame

(7) and prevent it from rebounding. The door locking mechanism prevents the collision of door with satellite during deployment. Two micro switches (22) are mounted on the outer panels of canister (15) to confirm the full opening of door (7). The switches (22) are wired to give a closed circuit when the door is in closed condition and open circuit when the door is opened. The micro switches (22) are mounted to the side panel, near to the hinge adaptor. When the door is in closed condition the micro switches (22) are pressed by the locking pin (23) of door and a sensor generates a closed-circuit signal. A compression spring (24) for door locking is provided for the release. The switches (22) are released when the door (7) is opened fully and provides a confirmation signal of full opening of the door (7).

[0049] Figure 8 shows the configuration in which the switches are disengaged when the door is opened fully and provide a confirmation signal of full opening of the door(7) with the aid of door locking compression spring (24).

[0050] In accordance with an embodiment of the present invention, the system comprises two reed switches which ensure the full ejection of satellite (21) from the canister. Reed switches are disposed on the side panel, nearer to the door hinge adaptor and magnets arepositioned on pusher plate assembly. When the pusher plate reaches its final position, after jettisoning of satellite, the magnets are aligned with the sensing zone

of the reed switch indicating a successful satellite ejection from the canister.

[0051] In accordance with a non-limiting embodiment of the present invention, the door opening actuation time is less than 400 ms. The satellite is fully ejected out within 900 ms after receiving the command from a control station. The door locking mechanism prevents collision of door assembly with satellite of each door. The deployment velocity is in the range of 1.3 m/s to 3.1 m/s corresponding to satellite mass from 6kg to 1kg. The base mounting and back mounting configurations are employed for the system. The deployment can be extended to 1U, 2U, 6U, 12U and 24U versions of satellites.

[0052] A non-pyro, shock-less and debris free door opening mechanism operated by an electrical command is employed for the system. The door opening actuation time is less than 400 ms. The satellite will be fully ejected out within 900 ms after receiving the command. The door locking mechanism prevents door collision, with satellite of each door. The deployment velocity is in the range of 1.3 m/s to 3.1 m/s corresponding to satellite mass from 6kg to 1kg. The base mounting and back mounting configurations are employed for the system. The deployment can be extended to 1U,2U,6U,12U and 24U versions of satellites.

Advantages:

[0053]The present invention has the following technical advantages:

1. The present invention provides a satellite dispensing system having a simple configuration with rapid actuation system. The system is cost effective and advanced in comparison to the conventional satellite dispensers.
2. The system of the present invention is capable to store multiple satellites into the canisters for launching into the orbit.
3. The present invention provides a non-pyro, shock-less and debris free door opening mechanism which is operated and controlled by an electrical command employed for the system.
4. In accordance with the present system, the door opening actuation time is less than 400 ms.
5. The present invention is capable of ejecting the satellite within 900 ms after receiving the command.
6. The present invention multiple canister configuration whereas each canister (15) store one 3U class satellite (21) having a mass up to 6 kg.
7. In accordance with the present invention, the deployment can be extended to 1U,2U,6U,12U and 24U versions of satellites.

The foregoing description of the invention has been set merely to illustrate the invention and is not intended to be limiting. Since modifications of the

disclosed embodiments incorporating the substance of the invention may occur to person skilled in the art, the invention should be construed to include everything within the scope of the disclosure.

We Claim :

1. A satellite dispensing system for cubesat, the system comprising:

a structure having multiple canisters for storing the satellites,

a door assembly removeably adapted at the opening side of each canister;

a door lock and release mechanism disposed inside each door assembly to lock and release the door;

a wire unit connected with each door lock and release mechanism at one end and to a fuse at another end; and

a control unit having an actuator unit connected with the fuse, the control unit is configured to fuse the wire unit to release each satellite from the canister into a predefined orbit upon receiving an actuation command in a predetermined fraction of time.

2. The satellite dispensing system for cubesat as claimed in claim 1, wherein each canister is connected with a pusher plate and a compressed jettisoning spring for ejecting the satellite out of the canister.

3. The satellite dispensing system for cubesat as claimed in claim 1, wherein the pusher plate exerts a force in the event of fusing of the wire unit.

4. The satellite dispensing system for cubesat as claimed in claim 1, wherein the structure comprises a clamping rail mechanism having multiple rails located at the corners of the canisters to support and restrain the lateral movement of the satellite.

5. The satellite dispensing system for cubesat as claimed in claim 1, wherein the predetermined time is 900 ms after receiving the actuation command signal.

6. The satellite dispensing system for cubesat as claimed in claim 1, wherein the door lock and release mechanism is having :

a door assembly removeably adapted at the opening side of the canister;

a pair of release pin disposed at the side of door assembly, the release pins are attached to preloaded linear springs;

a piston middle having a piston connected with the preloaded linear springs, the piston middle is placed at a rocker link and supported by a pair of plunger pins to restrain the movement of release pins in the locked condition;

a lever arm connected to the rocker link at one end and to a metal wire at another end, the metal wire is adapted to prevent the rotation of the arms and holding all the links to keep the door locked till the ejection of the satellite; and

a door-locking mechanism disposed near the door hinge to lock the door after ejection of the satellite.

7. The satellite dispensing system for cubesat as claimed in claim 6, wherein the door lock and release mechanism is disposed in each door assembly.

8. The satellite dispensing system for cubesat as claimed in claim 6, wherein the piston middle is connected with a piston middle spring.

9. The satellite dispensing system for cubesat as claimed in claim 6, wherein the door assembly comprises a closure plate to cover the lock and release mechanism.

10. The satellite dispensing system for cubesat as claimed in claim 6, wherein the metal wire unit is connected with a fuse to retract both the release pins from their locked condition and allows the door to open.

11. The satellite dispensing system for cubesat as claimed in claim 6, wherein the metal wire unit is fused upon receiving an input current allowing the rotation of the lever arms.

12. The satellite dispensing system for cubesat as claimed in claim 6, wherein the preloaded linear spring are disposed in a cavity provided in the structure to lock the door in the closed condition.

13. The satellite dispensing system for cubesat as claimed in claim 1, wherein the system comprises reed switches disposed on the side panel nearer to the door hinge adaptor and magnets disposed at pusher plate assembly.

14. The satellite dispensing system for cubesat claimed in claim 1, wherein the satellite is a cubesat satellite.

15. The satellite dispensing system for cubesat as claimed in claim 1, wherein the pusher plate is connected with a stopper bracket to restrain the movement of the pusher plate after ejection of the satellite.

16. A satellite dispensing system for cubesat as claimed in claim 1, wherein the clamping rail mechanism comprises a pre-loading stud attached to the door frame which pushes a rod against a cam.

17. The satellite dispensing system for cubesat as claimed in claim 1, wherein the system is having a payload capacity of 24 kg.

18. The satellite dispensing system for cubesat as claimed in claim 1, wherein each canister store one 3U class satellite having a mass up to 6 kg.

19. A satellite dispensing system for cubesat deployer as claimed in claim 1, wherein the system comprises micro switches adapted for each satellite to sense the opening of the door assembly.

Dated this 21st day of September, 2021

For Indian Space Research Organization
By their Agent

(ANSHUL SUNILKUMAR SAURASTRI) (IN/PA 3086)
KRISHNA & SAURASTRI ASSOCIATES LLP

ABSTRACT

A SATELLITE DISPENSING SYSTEM FOR CUBESAT

The present invention relates to a satellite dispensing system for cubesat. The system comprising: a structure having multiple canisters for storing the satellites, a door assembly removeably adapted at the opening side of the canister; a door lock and release mechanism disposed inside the door assembly to lock and release the door; a wire unit connected with the door lock and release mechanism at one end and to a fuse at another end; anda control unit having an actuator unit connected with the fuse, the control unit is configured to release each satellite from the canister into a predefined orbit upon receiving an actuation command signal in a predetermined fraction of time.

Reference Figure: Figure 1